

# RHABDOMYOLYSIS

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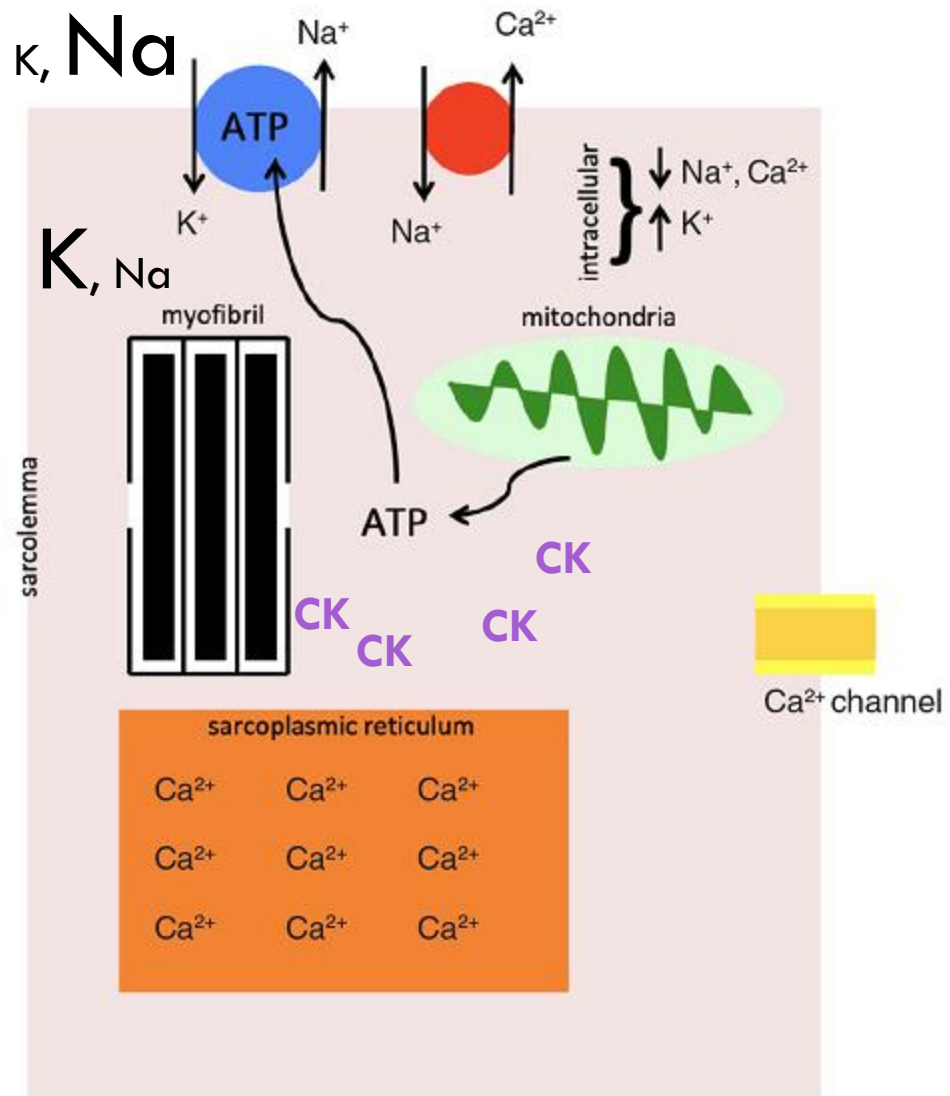
# OBJECTIVES

- Recognize the clinical syndrome of rhabdomyolysis
- Describe complications of rhabdomyolysis
- Identify potential etiologies of rhabdomyolysis
- Outline the evaluation of a patient with rhabdomyolysis
- Introduction to the management rhabdomyolysis

*A 25-year-old man is brought to the ED in police custody. The police officer states that the man was found running in the street, screaming incoherently, and attacking passersby. The man is in 4-point hard restraints and is severely agitated, thrashing on the EMS gurney and yelling profanities. He is tachycardic but his other vital signs are normal.*

# What is rhabdomyolysis?

- dissolution of skeletal muscle
- characterized by leakage of muscle cell contents into the extracellular fluid and circulation
  - myoglobin
  - sarcoplasmic proteins (creatinine kinase, lactate dehydrogenase, aldolase, aminotransferases)
  - electrolytes (Na, K, Ca, phos)
- can be limb and life threatening
- clinical triad: muscle pain, muscle weakness, dark urine



# Causes

Category	Causes
Trauma	Crush syndrome, compartment syndrome, prolonged immobilization, electrical injuries, burns
Exertion	Strenuous exercise, seizure, severe psychomotor agitation (eg, alcohol withdrawal, stimulant intoxication)
Extremes of body temperature	Medication-induced: serotonin syndrome, malignant hyperthermia, neuroleptic malignant syndrome Environmental: hyperthermia, hypothermia
Metabolic derangements	Hypokalemia, hypophosphatemia, hypocalcemia, hyperglycemia
Muscle ischemia	Arterial occlusion (thrombotic, embolic)
Drugs and toxins	Medications: lipid-lowering agents (statins, fibrates), proton pump inhibitors, psychiatric medications (SSRIs, SNRIs, TCAs, barbiturates, benzodiazepines, phenothiazines, lithium), opioids, salicylates, antihistamines, propofol, azathioprine, quinidine, succinylcholine, thiazides, vasopressin, pentamidine, terbutaline, theophylline Illicit drugs: amphetamines, cocaine, LSD, PCP, synthetic cannabinoids, bath salts Other toxins: alcohol, carbon monoxide, arsenic
Infection	Viral: influenza A and B, coxsackievirus, Epstein-Barr virus, HIV Bacterial: <i>Staphylococcus aureus</i> , <i>Clostridium</i> , <i>Legionella</i> , <i>Streptococcus pyogenes</i>
Genetic disorders	Disorders of glycolysis or glycogenolysis, disorders of lipid metabolism, mitochondrial disorders, disorders of skeletal muscle contraction/relaxation, disorders of purine metabolism, sickle cell disease
Autoimmune disorders	Dermatomyositis, polymyositis, systemic lupus erythematosus

Abbreviations: HIV, human immunodeficiency virus; LSD, lysergic acid diethylamide; PCP, phenylcyclohexyl piperidine; SNRIs, serotonin-norepinephrine reuptake inhibitors; SSRIs, selective serotonin reuptake inhibitors; TCAs, tricyclic antidepressants.

# Complications

- electrolyte derangement(s)
- acute kidney injury (AKI)
- compartment syndrome
- disseminated intravascular coagulation (DIC)



# Evaluation

- creatinine kinase (CK)
  - complete blood count (CBC)
  - complete metabolic panel (CMP)
  - calcium ( $\text{Ca}^{++}$ )
  - phosphorus ( $\text{PO}_4^{4-}$ )
  - urinalysis (UA)
- 
- electrocardiogram (ECG = EKG)

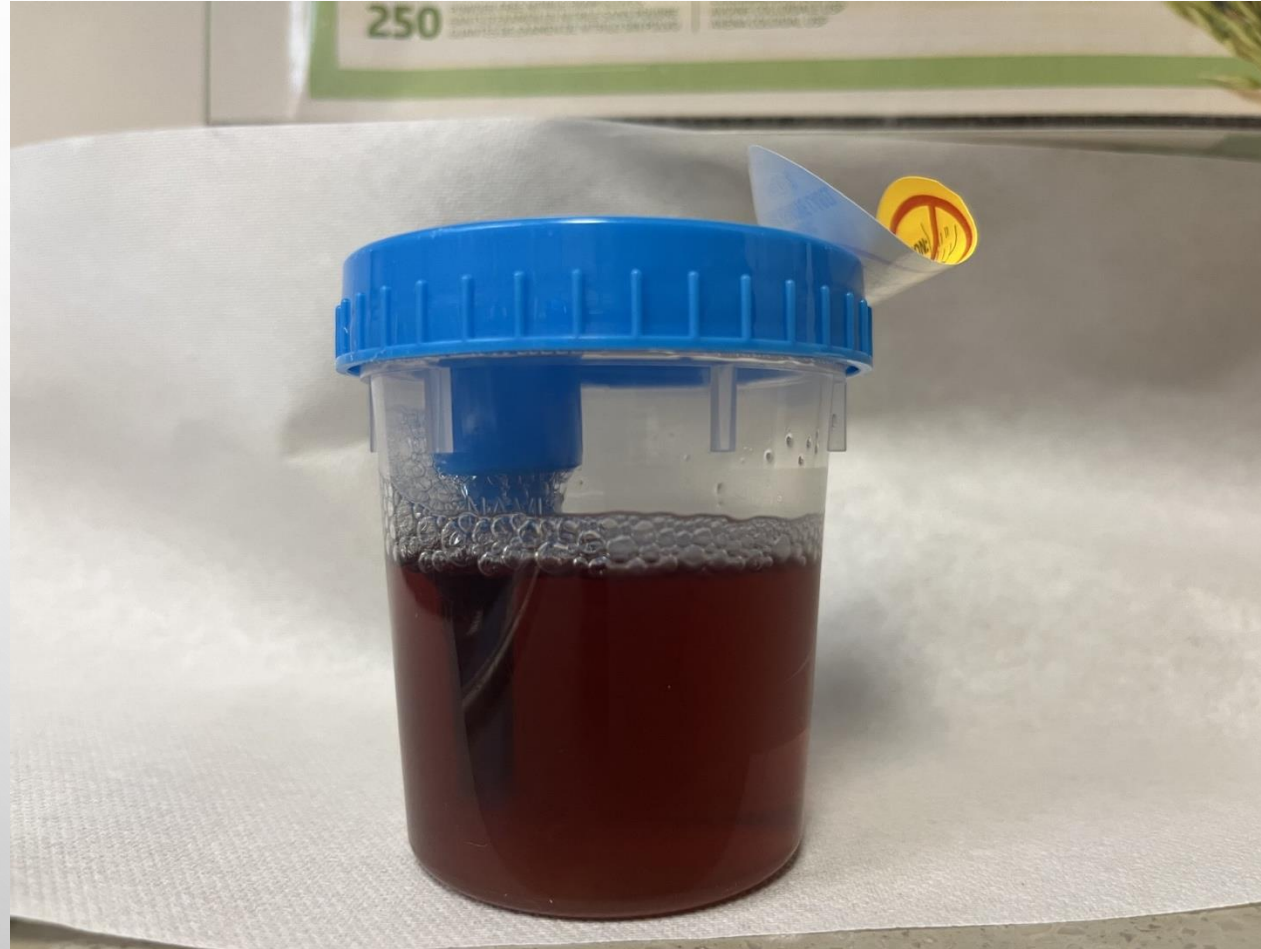


# Treatment

- address root cause
- intravenous fluids: normal saline, lactated ringers
- alkalization of the urine
- renal replacement therapy

# Special Considerations

- pediatrics
  - $\leq 9$  years MCC viral myositis
- genetic predisposition
  - sickle cell trait
  - be suspicious in patient with recurrent rhabdo
- HIV
  - case reports of occurrence during seroconversion



# References

- Stanley M, Chippa V, Aeddula NR, et al. Rhabdomyolysis. [Updated 2023 Apr 16]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: <https://www.Ncbi.Nlm.Nih.Gov/books/NBK448168/>
- Lee, Gi, et al. (2020). Rhabdomyolysis: Evidence-based Management in the Emergency Department. *Emergency Medicine Practice*.
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# QUESTIONS?

IN PERSON ATTENDANCE IS  
APPRECIATED